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Remedial Action Report
Vasquez Blvd. /I70 Superfund Site
CERCLIS ID CO0002259588
Operable Unit 01 – Residential Soils

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1. Introduction

The Vasquez Boulevard and I-70 (VB/I-70) Superfund Site (Site) comprises approximately 4.5 square miles, located in the north-central section of the City and County of Denver, Colorado. The VB/I-70 Site was placed on the NPL due to metals contamination associated with historic smelter operations. The primary contaminants of concern are lead and arsenic. Subsequent investigations indicated that arsenic contamination might also be present as a result of application of lawn care products.

For the purposes of investigations and remedy development, the Site was segregated into three operable units (OUs). This Remedial Action Report documents the cleanup activities that took place at Operable Unit 1 (OU1), Off-Facility (Residential) Soils of the VB/I-70 Site.

EPA was the lead agency for this action. The Colorado Department of Public Health and Environment (CDPHE) was the support agency.

1.1 Scope and Role of Operable Unit

In order to manage the Site effectively, the remedial program organized the VB/I-70 Site into 3 operable units (OUs). Separate investigations have been or are being conducted, and separate remedies will be selected for each OU. The OUs are:

> Operable Unit 1 (OU1) is defined as residential yards within the study area with levels of lead or arsenic in soil that present an unacceptable risk to human health. EPA's highest priority at VB/I-70 Site was OU1 because of the highest potential for human exposure to contaminants of concern located in the residential yards. EPA is the lead agency for remedial response activities at OU1, and Superfund primarily financed the response activities.
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> Operable Unit 2 (OU2) is defined as the location of the former Omaha & Grant Smelter and includes all environmental media impacted by releases of hazardous substances that resulted from the operation of that smelter. The Omaha & Grant Smelter was located on the property now home to the Denver Coliseum and other businesses. Contamination is likely limited to subsurface and groundwater impacts.
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> Operable Unit 3 (OU3) is defined as the location of the former Argo Smelter and includes all environmental media impacted by releases of hazardous substances from that smelter. The majority of the OU3 area is paved and has been extensively redeveloped since the smelter stopped operating.

Each operable unit has a unique physical location and historic operation. Thus, actions taken at one operable unit can be taken independently of actions at other portions of the Site, or can be taken in conjunction with each other, if appropriate.

1.2 Environmental Justice Considerations

EPA determined that the VB/I-70 Site is an Environmental Justice (EJ) site because the residents are predominantly low income and minority. It is also disproportionately affected by environmental impacts from many sources including industry, other Superfund sites, and major transportation corridors.

According to the 2000 census, the total population living within OU1 is 17,545, including approximately 2,400 children 6 years old or younger. A higher percentage of people who identify

themselves as minorities reside in VB/I-70 OU1 compared to the Denver citywide average, and average household incomes are lower in the VB/I-70 community than the average income for households in Denver citywide. Table 1 summarizes key demographic data by neighborhood.

Table 1
Demographic and Economic Indicators for the Neighborhoods of VB/I-70

	Clayton	Cole	Swansea-Elyria	Globeville	Denver
Total Population	5,172	5,662	6,708	3,454	560,663
# Children under 18	1,901	1,936	2,491	1,162	129,457
# Elderly 65+	432	406	437	227	59,262
% African American	38.9%	21.3%	5.3%	2.6%	10.8%
% Native American	0.6%	0.6%	0.7%	1%	0.7%
% Asian/Pacific Islander	2.1%	0.3%	0.3%	0.8%	2.8%
% Latino	50.2%	71.0%	83.0%	77.5%	31.7%
% Non-Latino White	6.0%	6.0%	9.9%	17%	51.9%
% Persons on Public Assistance	12.2%	12.3%	7.9%	3.8%	4.6%
% Persons in Poverty	28.5%	26.3%	27.9%	23.2%	14.3%
Ave Household Income	$44,122	$38,990	$38,435	$33,148	$55,087

1.3 Site History and Enforcement Activities

This section provides a summary of the history and enforcement activities related to OU1 of the VB/I-70 Site. The VB/I-70 Site came to the attention of EPA following studies directed by CDPHE at the adjacent ASARCO Globe Site (CERCLIS ID # COD007063530)

The ASARCO Globe Site

EPA proposed the ASARCO Globe Site be included on the NPL in May 1993. The proposal was never finalized. The ASARCO Globe Site was used for the smelting and refining of metals and metal based chemicals. In July 1993, the State and ASARCO Incorporated entered into a consent decree to resolve a suit under CERCLA filed by the State of Colorado. As part of that settlement agreement, ASARCO agreed to remediate soils in residential properties surrounding the Globe Plant where levels of cadmium, lead, and/or arsenic exceeded acceptable limits

established by the State in a Record of Decision. The State of Colorado is the lead agency for overseeing the cleanup activities on the Globe Plant Site and in the Globeville neighborhood.

The consent decree required ASARCO to collect soil samples from residential yards in the Globeville neighborhood and continue remediation until the extent of contamination from the Globe Plant was established. In conducting the investigation, ASARCO continued to find random occurrences of elevated levels of arsenic in residential yards at greater distances from the Globe plant site.

CDPHE continued to be concerned about the possible health risks to area residents potentially exposed to arsenic in yard soils and about the extent of the problem in the north Denver area. In 1997, CDPHE began a limited soil sampling program in the Elyria and Swansea neighborhoods, located just east of Globeville, across the South Platte River. These results indicated that high concentrations of arsenic in soil extended far beyond the Globeville neighborhood. Accordingly, CDPHE requested EPA's assistance in immediately responding to the elevated levels of arsenic and lead in soil found in the Elyria and Swansea neighborhoods.

The Vasquez Boulevard/I-70 Site

In 1998, EPA's first action at the Site was to mobilize an Emergency Response team to conduct an extensive soil sampling effort and time critical removal actions for the houses posing immediate health risks to local residents. The Emergency Response consisted of two phases. Phase I included an extensive screening level soil sampling effort. The objective was to collect soil samples from as many residential properties as possible to identify properties which were potential time critical removal candidates (remove and replace soil).

EPA established the boundaries of the Phase I sampling program as East 38th Avenue on the south, East 56th Avenue on the north, Colorado and Vasquez Boulevards on the east and the South Platte River on the west, and included the southwest portion of Globeville, the only area of Globeville not yet characterized by ASARCO.

Phase I sampling occurred during March and April 1998. A minimum of three grab samples were collected from each property where EPA obtained access, two samples from the surface and one from the subsurface. EPA also collected soil samples from all schools and parks located within the initial study area. Samples were collected from locations judged to present a high potential for exposure relative to other areas of the property (for example, at bare spots within the yard) and were analyzed for arsenic, lead, cadmium and zinc.

In September 1998, EPA issued an Action Memorandum that established the basis for conducting a time critical removal action. The Action Memorandum required that soil be removed and replaced at any property with an average arsenic soil level greater than 450 ppm and/or lead soil levels greater than 2000 ppm. These removal "action levels" were chosen to protect young children from adverse health effects related to short-term (sub-chronic) exposure. From the Phase I data, EPA identified 37 properties as potentially requiring time critical removal action.

The Phase II sampling occurred in July and August 1998. Additional soil samples were collected from any residential properties that had a maximum surface soil concentration equal to or greater than 450 ppm for arsenic or 2000 ppm for lead, i.e., the removal action candidates. EPA's Removal team revisited these residential properties and collected a 5-point composite sample from the front yard and a second 5-point composite sample was collected from the back yard of each property. Arsenic and lead levels in these samples were measured and any property with

one or more composite samples exceeding the removal action levels for either arsenic or lead was identified for soil removal.

Also in Phase II, the On Scene Coordinator extended the Site boundaries south to East 35th Avenue, encompassing a greater portion of the Cole and Clayton neighborhoods. Properties not sampled during Phase I were targeted for screening level sampling using the Phase I protocols. In all, EPA sampled 1,393 properties as part of the Phase I and II programs. As a result of the Phase II sampling, EPA conducted Removals at an additional 30 properties in 2000.

Based on the results of the Phase I and Phase II sampling programs, EPA determined that numerous residential properties within the VB/I-70 Site contained concentrations of arsenic or lead at levels that could present unacceptable health risks to residents with long term exposures. On this basis, the EPA proposed the VB/I-70 Site for inclusion on the NPL in January 1999. Anticipating the need for long-term response, EPA began Phase III remedial investigation activities in August 1998 as removal activities were underway.

During the public comment period on the proposed NPL listing of the VB/I-70 Site, ASARCO submitted information indicating that the source of the arsenic in residential soil may be lawn care products that were readily available for residential use in the Rocky Mountain Region and elsewhere in the west in the 1950s and 1960s. These products were legally formulated with arsenic trioxide and lead arsenate to be effective in controlling crabgrass. ASARCO specifically identified "PAX 3- year Crabgrass Control," available from the 1950's until the early 1970's, and formulated with 27% arsenic trioxide and 8% lead arsenic oxide. The product is no longer available commercially.

In order to assess ASARCO's arguments, EPA's Phase III remedial investigation activities focused on collecting all the information necessary to accurately characterize exposure and risk to residents at the VB/I-70 Site to support a quantitative baseline human health risk assessment. Secondly, efforts began to investigate the source of the arsenic and lead in residential soils. Toward that end, EPA used its CERCLA Section 104(e) information gathering authority to acquire a 6-ounce sample of the "PAX 3-year Crabgrass Control" product from Martin Resources, a company that acquired the company that had manufactured PAX. Tests on the PAX sample formulation provided by Martin Resources were helpful to EPA, but by themselves proved inconclusive to determine whether all arsenic and lead found in the VB/I-70 residential soils derived from pesticides or smelter emissions, or both.

On March 6, 2003, EPA issued an Action Memorandum that established the basis for conducting a non-time critical removal action. The Action Memorandum required the removal and replacement of soil at any property that had an arsenic soil level greater than 240 ppm and/or lead soil levels greater than 540 ppm. These "action levels" were chosen to address the properties that present the highest risk of adverse health effects to children and adult residents. From the Phase II sampling results, EPA identified 143 properties as requiring a soil cleanup. In 2003, EPA conducted cleanups at 133 of these properties, the properties not addressed by the non-time critical removal action were included in the list of properties to be addressed by this remedial action.

1.4 Enforcement Activities

EPA Region 8 conducted a PRP Search for the Site to identify the current property owners and past owners and operators. EPA identified ASARCO Incorporated as the primary operator of 2 of the 3 smelters historically located in the general area of the VB/I-70 Site - the Globe Smelter and the Omaha & Grant Smelter. EPA also identified the City and County of Denver as a current owner and a past owner/operator of a large portion of the property located within OU2 of the Site.

Other current owners or past owner/operators of the property located within OU2 of the Site include Pepsi Bottling Group, Union Pacific Railroad, and the Forney Museum. ASARCO, the City and County of Denver, Pepsi and Union Pacific all received and responded to CERCLA Section 104(e) information requests.

EPA determined that ASARCO was liable for the lead contamination found in OU1 of the Site. However, ASARCO argued that the arsenic requiring remediation came from sources other than smelter emissions. Based on the liability arguments and on ASARCO's financial status at the time the Region decided not to issue an Order to ASARCO to perform the cleanup of OU1 of the Site.

In 2004, EPA, CDPHE, and ASARCO agreed to a consent decree that resolved ASARCO's liability at OU 1 of the VB/I-70 Superfund Site. The consent decree required ASARCO to conduct residential soil cleanups at 100 properties, provide a repository within the ASARCO Globe Site for all residential soils removed during this Remedial Action, and conduct all operations and maintenance required at the repository as part of the ARSCO Globe Plant Site.

1.5 Community Participation

Due to the high degree of public interest, the large population impacted by OU1, and the cultural differences among the communities, EPA and CDPHE expanded community involvement to provide for extensive public input throughout the Remedial process. Expanded public involvement included conducting a stakeholder assessment, establishment of a stakeholders working group, providing funding for a technical assistance grant, and additional public meetings and fact sheet mailings.

In August 1998, EPA formed a Working Group of stakeholders to provide an open forum for discussing all technical aspects of EPA's remedial investigation, remedial design and remedial action. The Working Group addressed the Environmental Justice concern of having the community participate in decision making by providing direct access to decision makers. Through the Working Group, data and issues were discussed, allowing for community input into decision making throughout the development and implementation of the remedial investigations, risk assessment, feasibility study remedial design, and remedy implementation.

The stakeholders attending the Working Group meetings included representatives from all parties that had an interest in OU1 of the VB/I-70 Site. The Working Group included representatives of the City and County of Denver; CDPHE; the Agency for Toxic Substances and Disease Registry (ATSDR); ASARCO; and representatives from the four Denver neighborhoods included in OU1. Stakeholders also included the Clayton, Elyria, and Swansea Environmental Coalition (CEASE) the recipient of a Technical Assistance Grant from EPA.

The VB/I-70 Site has been of interest to local, State and Federal elected officials including the Mayor of Denver, City Council members, State legislators, Congresswoman Diana DeGette and Senator Wayne Allard. These officials or their representatives were invited and often attended Working Group meetings.

Since much of the population living within the Site boundaries speaks Spanish, EPA translated outreach materials including the proposed plan, fact sheets, and flyers into Spanish. Public notices were translated into Spanish as well and published in local Spanish newspapers. For major public meetings and workshops, EPA provided simultaneous translations so that all participants could understand the presentations and ask questions. For small group meetings, the translator sat with those who spoke only Spanish.

2. Operable Unit Background

The selected remedy for OU1 consisted of 2 primary components, a Community Health Program and residential soil removal. The following is a summary of the description in the ROD of each component of the remedy.

2.1 Community Health Program

The Community Health Program was composed of two separate, yet partially overlapping, elements. The first element addressed risks to area children from non-soil sources of lead and from lead in soils above the action level of 400 ppm. The second element was designed to address children with soil pica behavior to reduce their risks to arsenic in soil above 47 ppm, the preliminary action level determined in the Baseline Risk Assessment for children with soil pica behavior. Pica behavior is a rare behavior in which children intentionally eat unusually large amounts of soil. Participation in one or both elements of the program would be strictly voluntary, and there was no charge to eligible residents and property owners for any of the services offered by the Community Health Program. Each of these two main elements of the program is described below.

Community Health Program - Lead Exposure Risk Reduction

The program for reduction of lead risks was intended to be general. That is, it was intended to assess risks from lead from any and all potential sources of exposure, with response actions tailored to address the different types of exposure source that may be identified. The lead program consisted of three main elements:

1. Community and individual education about potential pathways of exposure to lead, and the potential health consequences of excessive lead exposure,
2. A biomonitoring program by which any child (up to 72 months old) may be tested to evaluate actual exposure, and
3. A program that provides a response to any observed lead exposure that is outside the normal range. This response included any necessary follow-up sampling, analysis, and investigation at a child's home to help identify the likely source of exposure. If the source of lead was found to be from residential soils, the property received a high priority for soil removal. If the main source was judged to be non-soil related, responses included education, counseling, and/or referral to environmental response programs offered by other agencies.

Community Health Program - Arsenic Exposure Reduction, Soil Pica Behavior

The Community Health Program for arsenic was designed to focus specifically on the potential risks to young children that exhibit soil pica behavior. Pica behavior is a rare behavior in which children intentionally eat unusually large amounts of soil. The program for arsenic consisted of three main elements:

1. Community and individual education about identification and potential hazards of soil pica behavior and the potential health consequences of excessive acute oral exposure to arsenic.
2. A biomonitoring program by which any child was tested to evaluate actual soil pica exposure to arsenic.

3. A program that provided a response to any observed inorganic arsenic exposures that are outside the normal range. The response included any necessary follow-up sampling, analysis, and investigation at a child's home to help identify the likely source of exposure, and to implement an appropriate response that will help reduce the exposure. If the source of arsenic was found to be from residential soils, the property received a high priority for soil removal. If the main source was judged to be non-soil related, responses included education, counseling, and/or referral to environmental response programs offered by other agencies.

2.2 Residential Soil Removal

Soil removals occurred at properties that had lead or arsenic soil concentrations greater than the action levels. The action level for lead is exceeded when the average lead concentration from the three composite soil samples taken from the property was greater than 400 ppm. The action level for arsenic was exceeded when the highest arsenic concentration from the three composite soil samples taken from the property was greater than 70 ppm.

For properties where soil removal is conducted, all accessible soils will be removed to a depth of 12 inches. The excavation depth may be reduced in order to prevent damage to large trees or structures.

At the homeowner's request, flower beds and vegetable gardens were sampled individually. If the concentrations of lead and arsenic in the flower beds or vegetable gardens are found to be below the action levels, then soil removal was not required in these areas. This was the only situation where a partial soil removal could occur at a property.

The excavation areas were backfilled with clean soil containing arsenic and lead concentrations at or below action levels, and pre-remediation yard features restored. If sprinkler systems were present, the system was removed and reinstalled. Based on Remedial Investigation data, it was estimated that soil removal would occur at a total of 853 residential properties within VB/I-70 OU1 (508 properties for arsenic only, 108 properties for both lead and arsenic, and 237 for lead only).

All excavated soils were transported to the ASARCO Globe Plant Site to be used as cover and grading consistent with the provisions of the Statement of Work as set forth in the Final Consent Decree pursuant to State of Colorado vs. ASARCO, Civ. Action No. 83-C-2383 or as otherwise approved by the State. For purposes of this remedial action, and consistent with Section 300.400(e)(1) of the NCP, EPA determined that the ASARCO Globe Plant was suitable area in very close proximity to the contamination, which was necessary for the implementation of the response action. Further, since EPA noted that the ASARCO Globe Plant and the adjacent VB/I-70 OU1 neighborhoods were "reasonably related on the basis of geography", and since "the basis of threat or potential threat to the public health or welfare of the environment" were similar (i.e., smelter wastes containing, among other constituents, arsenic and lead), EPA elected to treat the contiguous ASARCO Globe Plant as part of the VB/I-70 Site for remediation purposes. Accordingly, a permit is not required for EPA to dispose of residential soil removed from yards within the Cole, Clayton, Swansea, or Elyria neighborhoods at the ASARCO Globe Plant. See, CERCLA Section 121(e). EPA also notes that depositing the VB/I-70 residential soils at the ASARCO Globe Plant is protective of human health and the environment, complies with all ARARs for the remedy selected at VB/I-70 OU1, and accelerated the cleanup at that portion of the ASARCO Globe Site. Lastly, EPA believed disposal of the VB/I-70 residential soil at the ASARCO Globe Plant

enhanced its prospects for future reuse as a commercial or recreational facility. Land use restrictions and/or controls have been imposed on the ASARCO Globe Plant to ensure that the soils deposited there as part of this cleanup will not pose a future risk in the event the Plant's current land use changes. The placement of the soils removed from the VB/I70 residences at the ASARCO Globe Plant was found acceptable to the Globeville community.

2.3 Sampling Program

Prior to the Record of Decision, approximately 75% of the residential properties within the VBI-70 Site boundary had been sampled for lead and arsenic. Because the spatial pattern of lead and arsenic contamination is variable throughout the Site, it was not possible to assess if a specific property requires a soil removal without data from that property. Therefore, a program of on-going soil sampling was implemented at residential properties within the Site boundaries that were not adequately tested. The sampling program continued through the completion of the soil removal portion of this remedy.

The soil sampling program began with the identification of properties that required sampling. Once access had been obtained from the property owner to conduct the sampling, soil samples were collected from the property and analyzed for lead and arsenic. The results were provided to the property owner and evaluated to determine if a soil removal was needed. If a soil removal was needed, the property was referred to the contractor conducting the soil removal.

2.4 Remedial Design

Two remedial designs were completed for this remedial action. An EPA contractor prepared the first remedial design for the Community Health Program. EPA issued the Community Health Program design in March 2003. This remedial design provided the general planning documents and standardized procedures needed to implement the Community Health Program. This design was refined by the City and County of Denver (Denver), the organization given the responsibility for implementing the Community Health Program.

The second design, issued in March 2003, addressed the residential soil sampling and the implementation of the residential soil cleanup for the non-time critical removal action. The design provided standards and practices to be followed during the implementation of the remedial action. In addition, a detailed design was prepared for each residential property in cooperation with the homeowner based on the procedures set forth in the design.

3. Construction Activities

The remedial action for OU1 of the VB/I-70 Site consisted of two primary components, the community health program and residential soil removal. This section summarizes the activities conducted for the two components of the remedy.

3.1 Community Health Program

The community health program was developed in consultation with the Working Group, an advisory stakeholders group for the VB/I-70 Site. The community health program was made up of two activities, providing biomonitoring services for children and conducting community outreach.

Biomonitoring

The primary goal of the biomonitoring program was to test young children and pregnant women to determine if they had been exposed to lead and/or arsenic. This was accomplished through the following tasks:

- Establish and staff periodic testing clinics in each neighborhood
- Collect and analyze biomonitoring samples
- Report results to each participant
- Recommend parents to environmental and medical follow-up actions, if needed

Thirty-eight clinics were held between November 2004 and October 2006. During this time, 661 individuals participated in the biomonitoring program. Twenty individuals were identified with elevated blood lead above the Centers for Disease Control and Prevention (CDC) concentration of 10 ug/dL. A total of 94 individuals were identified with elevated blood lead concentrations, concentrations ranging from 5 – 10 ug/dL. The parents of the children found with elevated blood lead concentrations were referred to organizations that were able to provide environmental and medical follow-up actions.

Community Outreach

Denver conducted community outreach on a door-to-door canvassing outreach model, utilizing community health workers to provide individual health education. The community health workers were community members that Denver trained to provide health information concerning lead and arsenic exposure and be a resource contact. The community health workers were trained to provide the following information:

- Health effects of lead
- Health effects of arsenic
- Soil pica behavior
- Soil sampling and soil removal aspects of the remedy
- Biomonitoring program

Community health workers conducted home visits at 94% of the homes within the site boundaries.

In addition to home visits, outreach was conducted to realtors and contractors that live or work within the site communities by mailing them relevant information.

3.2 Residential Soil Removal

Property remediation began in 2003 as part of a non-time critical removal action. Property remediation under remedial action began in 2004 and was concluded in 2008. The following table is a summary of the number of properties remediated each year.

Year	Number of Properties Remediated
2003	133
2004	326
2005	134
2005 - ASARCO	62
2006	56
2006 - ASARCO	38
2008	3
Total	752

During the remedial action, all contaminated soils were transported to the ASARCO Globe property for disposal. This soil was placed with soils removed during the ASARCO Globe Site residential cleanup. All maintenance of the residential soils repository is being conducted as part of the ASARCO Globe Site actions.

After the clean soil had been placed in the yard, the property was landscaped in accordance with the homeowner agreed upon restoration plan. If sod was included in the restoration plan, then the property was watered for a 30 day period to establish the new sod.

Exterior lead based paint assessments were conducted at all properties that a received soil removal due to elevated lead concentrations. A total of 297 properties met the criteria for lead based paint assessments. During the assessment, all structures including garages, fences and sheds with chipping and peeling paint were tested for lead based paint. If there was sufficient peeling lead based paint on the property to cause recontamination of the soil above the action level, then an exterior lead based paint abatement was performed at the property. As a result of the assessments conducted, 120 homes received exterior lead based paint abatements. This work was performed in accordance with the Colorado "Regulation No. 19, Lead Based Paint Abatement."

Of the 4,470 residential properties within the site boundaries, 155 residential properties were not sampled and 33 residential properties identified as requiring a clean up were not cleaned up since the homeowner did not provide access to EPA despite contacting the homeowner numerous times. To assure, future residents at these unaddressed properties are aware of the potential or actual soil contamination, EPA is implementing the following institutional controls:

1. Send an annual notice letter to the resident stating that the property was part of the Vasquez Blvd. /I70 Superfund Site and this property had not been properly addressed.

2. Identify the unaddressed properties in the City of Denver's overlay district that identifies properties with environmental concerns. This would notify anyone seeking a building permit on the property

3. Place a notice on the land use record (title), stating that this property was part of the Vasquez Blvd. /I70 Superfund Site and was not properly addressed because the homeowner of record refused or did not respond to multiple request by EPA for access. This institutional control is designed to notify potential buyers of the environmental issues at the property.

4. Chronology of Events

Date	Event
July 21, 2003	Non-Time Critical Removal Action Start
March 14, 2003	Remedial Design Completed
Sept. 25, 2003	Record of Decision Signed
March 31, 2004	Remedial Action Started
April 1. 2004	Mobilize Soil Removal Contractor for 2004 Construction Season
July 2004	Start Community Health Program Development
Dec. 10, 2004	Demobilize Soil Removal Contractor for 2004 Construction Season
Dec. 2004	Complete Community Health Program Development
Jan. 2005	Complete Training of Community Health Workers
Feb. 15 2005	Mobilize Soil Removal Contractor for 2005 Construction Season
Feb. 2005 – Feb 2007	Complete First Home Visit, Community Health Program
June 2005 – Sept. 2006	Conducted Biomonitoring Clinics
Dec. 17.2005	Demobilize Soil Removal Contractor for 2005 Construction Season
Feb. 5, 2006	Mobilize Soil Removal Contractor for 2006 Construction Season
Sept. 22, 2006	Demobilize Soil Removal Contractor for 2006 Construction Season
March 2007 – Aug. 2007	Complete Second Home Visit, Community Health Program

5. Performance and Construction Quality Control

Remediation Objective / Cleanup Goals	Performance
Educate residents of health risks associated with lead and arsenic	Direct contact was made with 94% of the residents living within the site boundaries
Provide bioimonitoring services to residents to test actual exposure to lead and arsenic	38 biomonitoring clinics were held. A total of 661 individuals participated in the biomonitoring clinics.
Sample properties for lead and arsenic soil contamination which had not been sampled during the Remedial Investigation	96.5% of the 4,470 residential properties within site were sampled for lead and arsenic.
Remove and dispose of 12" of accessible soil at residential properties that had lead or arsenic soil concentrations greater than the action levels	The 12" soil removal depth was confirmed using grade stakes and was inspected to assure the standard had been met. The excavated soils were disposed at the ASARCO Globe Plant Site.

There were separate QA/QC plans for the Community Health Program and the Residential Soil Removal. EPA approved both of these QA/QC plans. The QA/QC plans enabled EPA to determine that all analytical results reported were adequate to ensure satisfactory implementation of the remedial action.

In addition, EPA performed a property audit to ensure that all residential properties within the operable unit boundaries were identified in the site database. The original data base was developed from the City of Denver's zoning maps. During the property audit each commercially zoned property was inspected to determine if it was being used as a residence. The audit identified additional172 residences that were not included in the site database for this remedial action.

6. Final Inspections and Certifications

This section summarizes the final inspection and certifications completed for the residential soil cleanup, health and safety issues, and institutional controls.

6.1 Residential Soil Cleanup

Through out the project, final inspections and certifications were completed as each residential property was completed. Once the remedy at a property had been completed and approved by homeowner, EPA and CDPHE conducted the final inspection. After the final inspection, EPA issued a letter to the homeowner certifying the remedial action had been completed at their property.

6.2 Health and Safety

EPA conducted monitoring of the workers performing the remedy throughout the remedial action. Personal air monitoring results showed no elevated exposure to lead or arsenic. Worker biomonitoring data showed no elevated concentrations of lead and/or arsenic.

6.3 Institutional Controls

Several properties were not addressed by this remedial action because the owner refused to provide access to EPA. To assure, future residents at these unaddressed properties are aware of the potential or actual soil contamination, EPA provided a grant to the City and County of Denver to implement the following institutional controls:

1. Send an annual notice letter to the resident stating that the property was part of the Vasquez Blvd. /I70 Superfund Site and this property had not been properly addressed.

2. Identify the unaddressed properties in the City of Denver's overlay district that identifies properties with environmental concerns. This would notify anyone seeking a building permit on the property.

3. Place a notice on the land use record (title), stating that this property was part of the Vasquez Blvd. /I70 Superfund Site and was not properly addressed since the homeowner of record refused or did not respond to multiple request by EPA for access. This institutional control is designed to notify potential buyers of the environmental issues at the property.

7. Operation and Maintenance Activities

There are not any operational and maintenance activities required as part of this remedial action.

8. Summary of Project Costs

The following table summarizes the federal funds expended for the primary components of the remedy and compares the expenditures to the cost estimate in the Record of Decision.

Remedy Component	Funds Expended
Soil Removal – Non-Time Critical Removal Action	$3,500,000
Soil Removal – Remedial Action	$11,850,082
Community Health Program	$2,041,362
Total Expended	$17,391,444
Record of Decision Estimate	$31,100,000

The overall cost of the project was $13.7 million under the cost estimate in the Record of Decision for this Remedial Action. The following is a description of the primary factors in the actual expenditures being lower for this Remedial Action.

- The actual cost per property was 30% lower than estimated in the Record of Decision. This is attributed to reduced claims by property owners due to complete documentation of existing conditions; area of soil removal per property was lower than used to prepare the estimate; and disposal of removed soils at the adjacent ASARCO Globe Superfund Site rather than a landfill that was located over 20 miles from the site. (Estimated Savings $5.0 million)
- Fewer properties were found that required soil removal than estimated in Record of Decision. (Estimated Savings $2.0 million)
- 100 properties were cleaned up by ASARCO, a responsible party for this site. (Estimated Savings $2.0 million)
- There were no unanticipated actions required during the Remedial Action. Thus, the capital cost contingency was not needed. (Estimated Savings $5.0 million)

9. Observations and Lessons Learned

- The soil removal costs were reduced through identifying a local disposal site for excavated soils and by working closely with homeowners throughout the cleanup, resulting in reducing the amount of homeowner claims.
- The visual audit to identify all residential properties within the site boundaries found 172 properties not on the original site database. Most of these properties were zoned as commercial properties and being used as residences.
- The community health program was able to contact traditionally difficult to reach people. This helped EPA to gain trust and access for EPA to conduct soil sampling and soil removal.
- The stakeholders' assessment was critical in making sure all viewpoints were included in site decision making.
- The Working Group, the site stakeholders group that met monthly, provided insight into how to effectively implement the remedy in this environmental justice community.

10. Operable Unit Contact Information

The following is the contact information for the primary personnel involved in implementing this remedial action:

Position	Contact Information
Remedial Project Manager	Victor Ketellapper USEPA (8EPR-SR) 1595 Wynkoop St. Denver, CO 80202 Phone: 303-312-6578 Email: ketellapper.victor@epa.gov
State Project Officer	Barbara O'Grady CDPHE P.O. Box 214 Gardiner, MT 59030-0214 406-848-9445 home 303-907-9773 cell
Soil Removal Project Engineer	Mary Darling U.S. Army Corps of Engineers Omaha District Rapid Response Program Offutt AFB, NE 68113 Phone: 402-293-2513 Email: Mary.N.Darling@army.mil
Community Health Program	Gene Hook Environmental Health Department City and County of Denver 201 W. Colfax Ave. Dept 1009 Denver, CO 80202 Phone 720-865-5365
Working Group Facilitator / Stakeholder Assessment	George Weber George Weber Environmental, Inc. 1275 Chambers Drive Boulder, CO 80305 Phone: 303-494-8572 Email: gw@gwenvironmental.com

Appendix A
Cost and Performance Summary

Parameter	Performance Measure	Cost
Soil Removal		
Indirect Costs		
Mobilzation	Mobilized for 3 construction seasons	$271,701
Field Office	Maintained field office for 4 years	$1,391,930
Lodging/Per Diem		$723,875
Work Plans/Reports		$36,199
Total Indirect Costs		$2,423,705
Direct Costs		
Equipement Maintenance		$148,357
Site Coordination - Pre Excavation	648 restoration agreements completed	$386,158
Removal Impacted Soils	720,463 cubic yards soil removed	$1,617,447
Disposal Impacted Soils	720,463 cubic yards soil disposed	$1,003,381
Sampling	922 properties sampled	$331,488
Restoration - Backfill	720,463 cubic yards of soil backfill	$2,959,398
Restoration - Sod	1,617,626 square feet sod installed	$977,759
Restoration - Garden / Flower Beds		$107,007
Restoration - Rock/Mulch	402,384 square feet mulch/rock installed	$431,923
Restoration - Sprinkler Systems		$144,976
Post Construction Maintenace	Sod irrigation for 30 days after installation	$44,234
Site Coordination - Post Excavation	652 property as built drawings, homeowner approval	$252,359
Air Monitoring	Community air monitoring	$189,925
Fuel		$249,610
Lead Based Paint Assessment	297 exterior lead based paint assessments conducted	$161,309
Lead Based Paint Abatement	120 exterior lead based paint abatements conducted	$982,214
PRP Oversight	100 property cleanup by PRP	$65,986
Contractor Fee		$717,103
Total Direct Costs		$10,770,634
Army Corps of Engineers		$2,155,743
Total Soil Removal		$15,350,082
Community Health Program	Conducted over 7000 home visits 661 participants in the biomonitoring program	$2,041,362
Total Remedial Action		$17,391,444